FCS Research Report 21

Integrated Petroleum Operations of Farmer Cooperatives, 1969

Farmer Cooperative Service, U.S. Department of Agriculture

FARMER COOPERATIVE SERVICE
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Farmer Cooperative Service provides research, management, and educational assistance to cooperatives to strengthen the economic position of farmers and other rural residents. It works directly with cooperative leaders and Federal and State agencies to improve organization, leadership, and operation of cooperatives and to give guidance to further development.

The Service (1) helps farmers and other rural residents obtain supplies and services at lower cost and to get better prices for products they sell; (2) advises rural residents on developing existing resources through cooperative action to enhance rural living; (3) helps cooperatives improve services and operating efficiency; (4) informs members, directors, employees, and the public on how cooperatives work and benefit their members and their communities; and (5) encourages international cooperative programs.

The Service publishes research and educational materials and issues *News for Farmer Cooperatives.* All programs and activities are conducted on a nondiscriminatory basis.

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Highlights

This study reviews the types of petroleum services provided to farmers by cooperatives in 1969 and compares them with similar operations in 1950 and 1957. The extent to which cooperatives have integrated these services from retail distribution back to the production and processing of crude oil is discussed.

Liquid Fuels

Approximately 2,720 cooperatives distributed about 3 billion gallons of liquid fuels (gasoline, diesel, kerosene, and fuel oil) at the retail level in 1969, or 2 percent of all liquid fuels used in the domestic trade in the United States. About 2.2 billion gallons of this volume were distributed by local cooperatives and the remainder by larger regional centralized cooperatives. Motor fuels made up about 70 percent of total retail sales by cooperatives and heating fuels, 30 percent.

Cooperative sales to farmers—2.3 billion gallons, or 76 percent of the total—comprised about 28 percent of the domestic farm market for liquid fuels in 1969. This compares with sales of 1.6 billion gallons and a 19-percent share of the market in 1957.

Local cooperatives obtained about 94 percent of their liquid fuel requirements through 24 wholesale cooperatives in 1969. Total volume distributed at wholesale by these cooperatives, however, totaled about 2.8 billion gallons, exceeding the volume distributed to affiliated locals by about 21 percent. This was due to excess production of some cooperative refineries, intercooperative business among wholesale cooperatives, and transfers from wholesale to retail divisions.

Some cooperatives also made sales direct from their wholesale divisions and refineries to noncooperatives. The net volume distributed by all cooperatives, therefore, totaled 3.8 billion gallons in 1969—3 percent of total domestic use in the United States. This compares with 2.5 percent of total domestic use in 1957 and 2.6 percent in 1950.

Production of liquid fuels by the eight cooperatively owned refineries in 1969 was about 70.9 million barrels (3 billion gallons), compared with 33.3 million barrels in 1950. These refineries processed a total of 68.8 million barrels, or 188,219 barrels a day, in 1969. This was only 1.8 percent of the total processed by all 281 domestic refineries, compared with 1.7 percent in 1957. Cooperatives, therefore, refined about 77 percent of the total fuels they distributed in 1969.

Co-op refineries had a crude distillation capacity of 1.8 percent of the total capacity of all refineries at the end of 1969. Cooperatives' combined cracking, reforming, coking, and alkylation capacity was slightly lower—1.7 percent of the industry total.

Approximately 95 percent of the liquid fuels sold at retail were delivered to patrons in co-op tank trucks. About 51 percent of the cooperative wholesale volume was also hauled from refineries and terminals to local plants in cooperative transports.

Although cooperatives handled more liquid fuels at all levels in 1969 than in 1957 and 1950, their share of total U.S. domestic use did not change significantly.

Liquefied Petroleum Gas

Cooperative distribution of liquefied petroleum (LP) gas increased greatly from 1957 through 1969. Approximately 501 million gallons of the 579 million gallons sold at retail in 1969 were purchased from wholesale cooperatives. This retail volume represented 3.7 percent of all domestic use in the United States. About 87 percent of co-op sales were to farmers, accounting for 21 percent of the total farm market. Cooperatives refined about 15 percent of the volume they wholesaled.

About 98 percent of the co-op LP gas sold at retail was delivered to patrons in trucks operated by cooperatives. Fifty-nine percent of the wholesale volume was also hauled to local associations in highway transports owned by cooperatives.

Lubricating Oil, Grease, and Other Products

Cooperatives distributed about 31 million gallons of lube oil and 14 million pounds of grease at retail in 1969—approximately 90 percent of each going to farmers. About 82 percent of this retail volume was obtained through wholesale cooperatives.

One cooperative refined 16.1 million gallons of lubricating oil in 1969, approximately 44 percent of total cooperative wholesale volume and 36 percent of total retail volume.

Cooperatives blended about 18.9 million gallons of lube oil—about 52 percent of total cooperative wholesale volume that year. One cooperative also manufactured 5.2 million pounds of grease, or 38 percent of the wholesale volume of cooperatives.

Other products manufactured in 1969 included 203,581 tons of coke by three cooperatives, 142,850 tons of asphalt by two cooperatives, and 5,630 tons of wax by one cooperative.

Crude Oil and Natural Gas

In 1969, cooperatives operated 8,111 oil wells on a gross basis and owned 1,954 wells on a net basis. In addition, they had net crude oil reserves of about 54 million barrels, 151,000 acres of net proven or producing oil lands, 2.4 million acres of prospective oil lands, and 162 billion cubic feet of natural gas reserves.

Cooperative refineries produced 163,419 barrels of crude oil a day on a gross basis from their own wells; that is, before eliminating oil belonging to royalty owners and partners in jointly owned leases. This was 87 percent of the quantity they produced in their own refineries, compared with 31 percent in 1957. Cooperative production was 1.8 percent of the U.S. total in 1969, compared with 0.6 percent in 1957.

Net ownership was 24,819 barrels a day in 1969, or only 13.2 percent of the crude oil refined or processed. The equivalent share in 1957 was 12.5 percent.

Four cooperatives produced 95 billion cubic feet of natural gas on a gross basis in 1969 and 17 billion cubic feet on a net basis.

In 1969, cooperatives transported about 47 percent of the crude oil they processed through their own gathering and trunk pipelines and less than 2 percent by co-op highway transports.

The 27 regional cooperatives reported net margins, before income taxes, of $36.6 million on their petroleum operations in 1969. About 53 percent of this amount came from distribution (mainly wholesale) operations and 47 percent from refining, production, and specialized transportation operations. Comparable data were not obtained in earlier years.

Tables summarizing cooperative petroleum operations in 1950, 1957, and 1969 follow:

Farmer cooperatives' share of U.S. petroleum market, 1950, 1957, and 1969

Product and market	Unit	1950	1957	1969
Liquid fuels sold at retail and at other levels (by wholesale divisions and by refineries direct)	Bil. gal.	1.6	2.2	3.8
Percentage of total domestic market	Pct.	2.6	2.5	3.0
Liquid fuels sold at retail	Bil. gal.	1.5	2.0	3.0
Percentage of total domestic market	Pct.	2.3	2.2	2.3
Co-op sales to farmers as percentage of total farm market	Pct.	19.1	19.3	28.2
LP gas sold at retail	Mil. gal.	15.0	90.7	579.0
Percentage of total domestic market	Pct.	0.4	1.3	3.7
Co-op sales to farmers as percentage of total farm market	Pct.	[1]	6.9	21.4
Lube oil sold at retail	Mil. gal.	18.0	21.3	30.8
Percentage of total domestic market	Pct.	[1]	[1]	2.2
Co-op sales to farmers as percentage of total farm market	Pct.	[1]	[1]	21.0
Grease sold at retail	Mil. lb.	18.3	20.1	14.0
Percentage of total domestic market	Pct.	[1]	[1]	2.2
Co-op sales to farmers as percentage of total farm market	Pct.	[1]	[1]	8.6
Refinery capacity and processing:				
Crude distillation per day	Bbl.	144,500	115,700	214,500
Percentage of U.S. capacity	Pct.	2.0	1.6	1.8
Catalytic cracking per day	Bbl.	21,300	64,550	74,400
Percentage of U.S. input capacity	Pct.	[1]	[1]	1.8
Percentage of U.S. output capacity	Pct.	1.0	1.5	1.9
Crude oil processed per day	Bbl.	106,900	138,369	188,219
Percentage of crude oil processed in United States	Pct.	1.9	1.7	1.8
Crude oil production:				
Quantity produced per day (gross)	Bbl.	29,400	42,653	164,318
Percentage of total producing oil wells in United States	Pct.	0.4	0.6	1.5
Percentage of total oil produced in United States	Pct.	0.5	0.6	1.8

[1] Data not obtained.

Extent of integration of cooperative petroleum operations, 1950, 1957, and 1969

Product and operation	1950	1957	1969
Liquid fuels	*Percent*	*Percent*	*Percent*
Retailing:			
Deliveries by own tank trucks	95	95	95
Wholesaling:			
Retail volume supplied by wholesale co-ops	93	95	94
Wholesale volume hauled in own highway transports	(1)	56	51
Refining:			
Wholesale volume produced in own refineries	86	85	106
Refinery output transported in own pipelines	(1)	22	28
Refinery output moved in own barges and tankers	(1)	8	6
Refinery output moved in highway transports	(1)	(1)	13
Crude oil processed that was transported by–			
Own pipelines	(1)	53	33
Own barges and tankers	(1)	5	0
Own highway transports	(1)	4	1.3
Producing:			
Crude oil processed from crude oil produced by co-ops (gross basis)	28	31	87
Crude oil processed from crude oil produced by co-ops (net basis)	14	13	13
Cooperatives' gross production moved in–			
Own gathering and trunk pipelines	(1)	66	47
Own barges	(1)	6	0
Own highway transports	(1)	(1)	1.5
LP gas			
Retailing:			
Deliveries by own tank trucks	(1)	90	98
Wholesaling:			
Retail volume bought from wholesale co-ops	98	98	96
Wholesale volume hauled in own highway transports	(1)	14	59
Refining:			
Wholesale volume produced in own refineries	(1)	31	15
Lubricating oil			
Wholesaling:			
Retail volume bought from wholesale co-ops	80	85	85
Wholesale volume blended in own plants	56	55	52
Refining:			
Wholesale volume refined in own refineries	30	49	45
Grease			
Wholesaling:			
Retail volume bought from wholesale co-ops	80	85	85
Manufacturing:			
Wholesale volume manufactured in own plants	28	26	38

[1] Data not obtained.

Integrated Petroleum Operations of Farmer Cooperatives, 1969

By

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Modern farming operations require large quantities of petroleum products—liquid fuels and lubricants to power motor-driven equipment and fuel oil and liquefied petroleum (LP) gas to heat homes and to dry crops. Many farmers look to their cooperatives for supplies of high-quality oil products at minimum costs.

Like other firms in the oil industry, cooperatives have found it advantageous over the years to vertically integrate their petroleum operations. From an initial start at the local retail level delivering fuel to farms, local cooperatives soon organized regional wholesale associations to purchase their needs and to blend lubricating oil. To assure a dependable source of fuels and to realize additional savings, wholesale cooperatives moved on to acquire small oil refineries and interests in producing wells. At each step of the integration process, cooperatives have supplied some of the essential transportation services. By integrating petroleum procurement back to the basic source of supply, farmer-members receive savings at each level via dividends on member capital and patronage refunds.

Purpose and Method of Study

This study determines the status of farmer cooperatives in procuring petroleum products for their members and indicates trends in the integration of these services. Operations in 1969 are compared with those in 1950 and 1957 when similar studies were made (fig. 1). Data are provided on physical quantities of products handled to determine the extent of integration and to calculate the cooperatives' share of the petroleum market. Information is also supplied on types and capacities of petroleum facilities owned or leased by cooperatives.

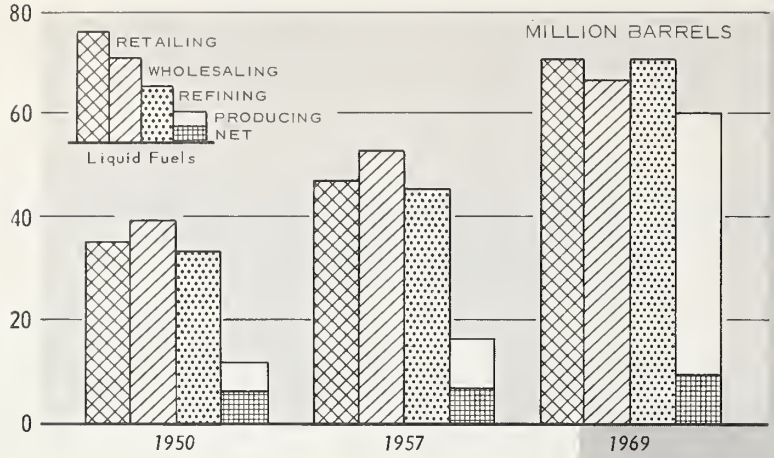
Mail questionnaires were used to obtain data from 27 regional cooperatives handling petroleum products in 1969 and 36 in 1957. (Several associations had operations at two or more levels in 1969. See app. table 1.) Since these cooperatives supply over 95 percent of the liquid fuels distributed at retail by all farmer cooperatives, information thus obtained was used to develop estimates of total retail distribution by cooperatives. Earlier findings were based on personal interviews reported in a 1950 study of the feasibility of further coordinating petroleum operations of regional cooperatives.

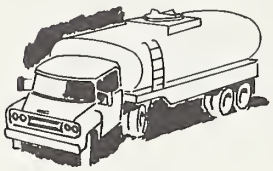
The principal integrated functions of petroleum services (and related transportation operations) are discussed in this report in the same order in which cooperatives vertically integrated these services—retailing, wholesaling, refining, and producing—back to the basic raw materials.

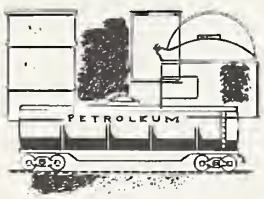
Retail Distribution

Cooperatives distribute petroleum products to farmers and other patrons through bulk plants, service stations, and tank trucks. Retail services, begun in the mid-1920's in the Midwest, became the foundation of all cooperative integrated petroleum operations. In the East and in many midwestern communities, petroleum is distributed by specialized cooperatives. Throughout the United States, an increasing number of grain and other marketing cooperatives have added petroleum departments or merged with separate oil co-ops.

Integrated Petroleum Operations of Farmer Cooperatives







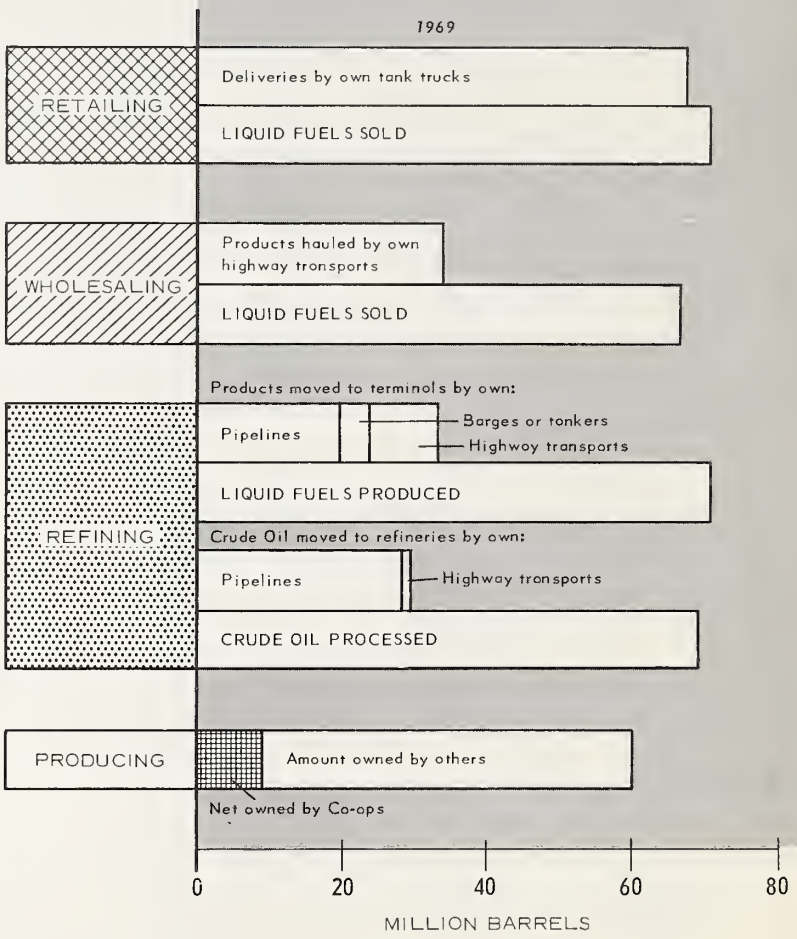


FIGURE 1

Number of Cooperatives and Facilities

Cooperatives distributing petroleum products at retail in 1969 totaled 2,723, about the same number as in 1957 (table 1). All but nine were local community or countywide associations.

The number of cooperatives distributing refined fuels and those selling only lubricating oil and grease in 1969 was not determined. In 1957, about 2,345 cooperatives handled liquid fuels and other oil products, and 448 sold only oil and grease.

In 1969, regional cooperatives estimated they and their member locals operated 3,392 bulk plants for liquid fuels and LP gas. Approximately 600 of these handled LP gas, compared with only 42 in 1957.

Cooperative service stations increased from 1,837 in 1950 to 2,204 in 1969. Operation of tank trucks for distribution of liquid fuel also rose from 5,370 in 1950 to 6,877 in 1969. Co-op tank trucks for LP gas increased from 70 in 1950 to 1,710 in 1969, reflecting the sharp rise in sales of LP gas during this period.

In 1969, local co-ops operated 324 over-the-road transports for hauling fuel from refineries and terminals to local bulk plants, a decrease of 118 from 1957.

Table 1.—Retail petroleum facilities operated by farmer cooperatives, 1950, 1957, and 1969

Type of facility or operation	1950	1957	1969
	Number	*Number*	*Number*
Cooperatives distributing petroleum products	2,677	2,794	2,723
Local bulk plants for liquid fuels	2,750	2,779	[1]3,392
Local bulk plants for LP gas	42	250	
Local service stations	1,837	1,964	2,204
Tank trucks for liquid fuels[2]	5,370	5,361	6,877
Tank trucks for LP gas[2]	70	323	1,710
Highway transports (capacity over 2,000 gallons) operated by local cooperatives	367	442	324

[1] Includes both liquid fuel and LP gas bulk plants.

[2] In some cases, truck chassis may have been owned by a salesman on commission and the tank by the cooperatives.

Liquid Fuels

Total volume of liquid fuels (gasoline, kerosene, diesel, and distillates) distributed at retail by farmer cooperatives in 1969 was approximately 3 billion gallons, or 71 million barrels (table 2 and fig. 1). Although this was a 100-percent increase over co-op sales of 1.5 billion gallons in 1950, retail sales of liquid fuels by cooperatives represented only 2.3 percent of total U.S. consumption of these fuels in 1969, approximately the same percentage as in 1950 and 1957. All but 5 percent of the liquid fuels distributed at retail by farmer cooperatives in 1969 were delivered in tank trucks operated by local associations.

Based on the breakdown of products sold at wholesale, motor fuels accounted for about 2.1 billion gallons, or 70 percent of total liquid fuels sold at retail by cooperatives in 1969. Heating fuels comprised the remaining 0.9 billion gallons, or 30 percent of the total.

Table 2.—Quantities of petroleum products sold at retail by farmer cooperatives, 1950, 1957, and 1969

Product	1950	1957	1969
	1,000 gallons	*1,000 gallons*	*1,000 gallons*
Liquid refined fuels	1,486,650	1,957,416	2,966,567
Liquefied petroleum gas	15,000	90,724	578,908
Lubricating oil	17,963	21,250	30,832
	1,000 pounds	*1,000 pounds*	*1,000 pounds*
Grease	18,312	20,136	14,021

Quantity Sold to Farmers for All Uses

As shown in table 3, cooperatives sold about 2.3 billion gallons of liquid fuels to farmers in 1969, about 28 percent of the total liquid fuel bought for all farm purposes that year. In both 1950 and 1957, co-ops supplied about 19 percent of the U.S. farm market for these fuels.

Seventy-six percent of the liquid fuels sold through affiliated retail outlets in 1969 went to farmers. By major products, 84 percent of the motor fuels and 59 percent of the heating fuels were sold to farmers. On this basis, cooperatives sold 1.7 billion gallons of motor fuels to farmers, or 26 percent of the farm market for such fuels, plus 0.6 billion gallons of heating fuel, or 40 percent of such fuel used by farmers.

Quantity Farmers Used in Production

Estimates also were made of fuels sold by cooperatives for farming or production use only. These estimates are based on farm expenditure data prepared by the Bureau of the Census and the Economic Research Service, USDA. Excluded are fuels used to heat farm homes, 60 percent of the gasoline for farm automobiles, and 25 percent of gasoline for trucks.

These statistics indicate that about 1.6 billion gallons of the total volume of liquid fuels sold by co-ops went into farm production (table 4). That is,

Table 3.–Total retail distribution of petroleum products by cooperatives, and share sold to farmers as a percentage of total farm use, United States, 1969

Product	Total retail distribution[1]	Percentage to farmers[2]	Volume sold to farmers by co-ops	Total U.S. volume used by farmers[3]	Cooperative share of U.S. farm volume
	1,000 gal.	*Pct.*	*1,000 gal.*	*1,000 gal.*	*Pct.*
Gasoline	1,699,843	84.2	1,431,268	5,169,000	27.7
Diesel	347,088	84.2	292,248	1,505,000	19.4
Total motor fuel	2,046,931	84.2	1,723,516	6,674,000	25.8
Heating fuels	[4] 919,636	58.7	539,826	1,342,000	40.2
Total liquid fuel	2,966,567	76.3	2,263,342	8,016,000	28.2
LP gas	578,908	87.1	504,229	2,354,000	21.4
Total petroleum fuels	3,545,475	78.1	2,767,571	10,370,000	26.7

[1] Allocated to products on basis of regional wholesale liquid petroleum volume (gasoline, 57.3 percent; diesel, 11.7 percent; kerosene, 1.5 percent; fuel oil, 28.7 percent; other heating fuels, 0.8 percent).

[2] Reported by regional co-ops.

[3] Estimates, Econ. Res. Serv., USDA.

[4] Includes 44.5 million gallons of kerosene, 851.4 million gallons of fuel oil, and 23.7 million gallons of other heating fuels.

cooperatives distributed about 25.5 percent of the motor fuel and 28 percent of the heating fuel used by U.S. farmers in production operations in 1969.

Liquefied Petroleum Gas

Total volume of LP gas distributed by farmer cooperatives increased substantially in the last decade. In 1969, co-ops sold 579 million gallons at retail, compared with 90.7 million gallons in 1957 and 15 million gallons in 1950. This volume represented about 3.7 percent of total LP gas consumed in the United States in 1969.

About 87 percent of cooperative LP gas sales–504 million gallons–were to farmers in 1969. Of this volume, 57 percent went into farm production, or 21

Table 4.–Retail distribution of petroleum products to farmers by cooperatives: Volume sold in 1968-69 and share used in farm production as percentage of total U.S. farm production use in 1968

Product	Volume sold to farmers by co-ops[1]	Percentage used in farm production[2]	Volume used in farm production	Total U.S. farm production use, 1968[2]	Percentage of U.S. farm production use sold by cooperatives
	1,000 gal.	*Pct.*	*1,000 gal.*	*1,000 gal.*	*Pct.*
Gasoline	1,431,268	81	1,159,327	4,185,692	27.7
Diesel	292,248	100	292,248	1,504,959	19.4
Total motor fuel	1,723,516	84	1,451,575	5,690,651	25.5
Heating fuels	539,826	23	124,160	450,415	27.6
Total liquid petroleum	2,263,342	70	1,575,735	6,141,066	25.7
LP gas	504,229	57	287,411	1,351,264	21.3
Total petroleum fuels	2,767,571	67	1,863,146	7,492,330	24.9

[1] From table 3. [2] Estimates by ERS, USDA.

percent of the total all farmers used in such production operations (table 4). All but 2 percent of the total volume of LP gas sold by cooperatives was delivered in trucks operated by the associations.

Total Volume of All Fuels

As shown in table 2, retail sales of both liquid fuels and LP gas by cooperatives totaled over 3.5 billion gallons in 1969, or about 2.6 percent of the total domestic market for such fuels that year. Approximately 78 percent of this volume, or nearly 2.8 billion gallons, went to farmers, accounting for almost 27 percent of the total farm market of 10.4 billion gallons but only 2.0 percent of total U.S. consumption (table 5). In 1942, cooperatives shared about 14 percent of the farm market.

About two-thirds of the volume sold by cooperatives to farmers in 1969, or 1.9 billion gallons, was used in farming operations—25 percent of the total all farmers used for such purposes.

Lubricating Oil and Grease

Cooperatives sold 30.8 million gallons of lubricating oil at retail in 1969, compared with 21.3 million gallons in 1957 and 18.0 million gallons in 1950 (table 2). Approximately 90 percent went to farmers, representing about 21 percent of the total purchased for farm use, or 2.2 percent of all U.S. lube oil sales in 1969.

Co-op sales of grease in 1969 amounted to 14.0 million pounds, down from 20.1 million pounds in 1957 and 18.3 million pounds in 1950 (table 2). Of this volume, all but 10 percent went to farmers, accounting for 8.6 percent of the total pruchased for farm use in 1969, or 2.2 percent of all U.S. sales of grease.

Table 5.—Total U.S. and farm use of petroleum fuels (liquid fuels and LP gas), and share distributed at retail by farmer cooperatives, selected years, 1942-69

Year	Total U.S. use	Total farm use	Distribution by co-ops to farmers		
			Total	Percentage of U.S. use	Percentage of farm use
	Mil. gal.	*Mil. gal.*	*Mil. gal.*	*Pct.*	*Pct.*
1942[1]	35,470	4,900	700	2.0	14.3
1947[1]	50,224	6,772	1,154	2.3	17.0
1950[1]	63,295	7,224	1,380	2.2	19.1
1953[1]	77,398	7,988	1,497	1.9	18.7
1957	[2]95,912	[3]8,404	[2]1,626	1.7	19.3
1959	[4]103,446	[5]8,610	[6]1,667	1.6	19.4
1969	[7]135,804	[8]10,370	[9]2,768	2.0	26.7

[1] FCS Service Report No. 24, p. 2 (includes LP gas after 1953), Dec. 1959. [2] Calculated from FCS General Report 58, May 1959. [3] Calculated on average yearly increase from 1953 to 1959. [4] Petroleum Facts and Figures, 1961 ed. [5] Liquid Petroleum Fuel Used By Farmers in 1959, USDA Statis. Bull. No. 344, May 1964. [6] Estimate based on 2.5-percent increase in farmers' production expenditures for petroleum from 1957 to 1959. [7] Mineral Industry Surveys, U.S. Dept. Interior, Bur. Mines, Dec. 1969. [8] ERS unpublished estimates. [9] Regional cooperative reports, 1968-69.

Wholesale Distribution

Farmers took the first step in vertically integrating petroleum services beyond the retail level when they formed wholesale oil cooperatives or wholesale departments of general supply cooperatives in the late 1920's. By pooling their purchasing power, local cooperatives found they could obtain better prices, realize additional savings, and ensure a more dependable supply of quality products.

Number of Cooperatives and Facilities

Twenty-four regional cooperatives supplied liquid fuels at wholesale to 2,453 affiliated local cooperatives in 1969, accounting for about 95 percent of all local cooperatives handling liquid fuels (table 6). This was an increase of about 230 locals over 1957, and 490 over 1950.

Other wholesale activities of cooperatives in 1969 included the supply of LP gas to 1,424 locals by 11 regional cooperatives and the distribution of lubricating oil and grease to 3,329 local associations by 24 regionals.

The acquisition of highway motor transports to haul liquid fuels from terminals to local bulk plants was another milestone in the integration of cooperative petroleum operations. This activity was undertaken to

Table 6.- Number of cooperatives distributing petroleum products at wholesale and local retail cooperatives served, 1950, 1957, and 1969

Type	1950	1957	1969
	No.	*No.*	*No.*
Cooperatives wholesaling–			
Liquid fuels	29	30	24
Liquefied petroleum gas	2	8	11
Lubricating oil and grease	32	31	23
Local retail co-ops these wholesaling co-ops supplied with–			
Liquid fuels	1,961	2,221	2,453
Liquefied petroleum gas	[1] 250	[1] 600	1,424
Lubricating oil and grease	2,500	[1] 3,000	3,329

[1] Estimated.

realize savings over rail transportation and in some cases to provide better service to local cooperatives. In 1969, 17 wholesale associations operated 331 transports, compared with 18 co-ops and 263 transports in 1957, and 18 co-ops and 214 transports in 1950 (table 7).

Early in the integration process, regional wholesale cooperatives also began to operate storage terminals, mostly marine facilities. Later these cooperatives acquired a few pipeline terminals as well.

In 1969, eight cooperatives operated 28 terminals for refined fuels (exclusive of those at refineries) with a capacity of 6,010,000 barrels (table 7). Twelve of these terminals were operated in 1950 with a capacity of 1,326,190 barrels.

Liquid Fuels

Over 2.8 billion gallons–67 million barrels–of liquid fuels were distributed in 1969 by the 24 regional wholesale cooperatives (table 8 and fig. 1). This was an increase of 73 percent over the 1.6 billion gallons, or 38.8 million barrels, sold in 1950.

About 2.2 billion gallons of these liquid fuels, or 79 percent of total sales, went to retail cooperatives; 19 percent was transferred to the wholesale cooperatives' retail divisions; and 2 percent was sold to other wholesale cooperatives and other firms. Regional cooperatives, therefore, supplied about 94 percent of the fuels distributed by their affiliated local associations in 1969.

The quantity and percentage of heating fuels and diesel fuel distributed in 1969 continued to increase, while gasoline, kerosene, and "other motor fuels" declined in importance. Heating fuels (excluding kerosene) comprised 28.7 percent of the total liquids sold in 1969, compared with 27.5 percent in 1957 and

Table 7.–Wholesale cooperatives having highway transports and storage terminals, number operated, and volume of refined fuels handled, 1950, 1957, and 1969

Item	1950	1957	1969
	Number	*Number*	*Number*
Cooperatives operating highway transports for hauling–			
Liquid fuels	18	18	17
LP gas	2	5	8
Highway transports (with capacity over 2,000 gallons) operated for–			
Liquid fuels	214	263	331
LP gas	1	11	156
	1,000 gallons	*1,000 gallons*	*1,000 gallons*
Quantities of fuel hauled by transports from refineries and terminals to local bulk plants:			
Liquid fuels	([1])	754,000	1,423,018
LP gas	([1])	13,000	309,675
	Number	*Number*	*Number*
Refined fuels storage terminals (exclusive of refinery terminals) operated at end of year:	[2] 12	20	28
	Barrels	*Barrels*	*Barrels*
Capacity at end of year	1,326,190	3,692,857	6,010,000
Number of cooperatives with such storage terminals	7	11	8

[1] Data not obtained.
[2] Also leased 4 terminals with a storage capacity of 476,190 barrels.

Table 8.--Quantity of petroleum products distributed at wholesale by cooperatives, 1950, 1957, and 1969

Item	1950	1957	1969
	1,000 gallons	*1,000 gallons*	*1,000 gallons*
Liquid refined fuels	1,628,277	2,210,119	2,804,038
LP gas	15,000	91,819	529,250
Lubricating oil	28,139	36,872	36,239
	1,000 pounds	*1,000 pounds*	*1,000 pounds*
Grease	19,313	25,539	13,788
	Percent	*Percent*	*Percent*
Types of liquid fuels:			
Gasoline	68.1	63.8	57.3
Diesel and other tractor fuels	10.6	5.9	12.5
Kerosene	6.6	2.8	1.5
Burning or heating fuel oils	14.7	27.5	28.7
Total	100.0	100.0	100.0
	Number	*Number*	*Number*
Regional cooperatives handling refined fuels	29	30	24

14.7 percent in 1950. Gasoline fell from 68.1 percent in 1950 to 57.3 percent in 1969.

Liquid fuels distributed at wholesale plus those sold directly by cooperative refineries exceeded total retail distribution in 1969 by 886 million gallons, or 23 percent. Comparable volume exceeded retail volume by 13 percent in 1957 and by 10 percent in 1950. This upward trend reflects the tendency of cooperative refineries to expand following each addition of modern cracking and reforming equipment.

Total distribution of liquid fuels by cooperatives, exclusive of intercooperative business, therefore, amounted to about 3.85 billion gallons in 1969—3 percent of the U.S. domestic market, compared with 2.5 percent in 1957.

As shown in table 7, 17 wholesale cooperatives operated 331 transports hauling 1,423,018,000 gallons (33,881,381 barrels) of liquid fuels in 1969, about 51 percent of the cooperative wholesale volume. This compares with 754 million gallons and 34 percent of the total wholesale volume in 1957.

Liquefied Petroleum Gas

Regional cooperatives reported distributing 529 million gallons of LP gas at wholesale in 1969, compared with 91.8 million gallons in 1957 and 15 million gallons in 1950 (table 8). These wholesale cooperatives distributed about 96 percent of the quantity sold at retail by cooperatives in 1969, about the same as in 1957 and 1950.

Eight regional cooperatives operated 156 transports hauling about 310 million gallons of LP gas in 1969 (table 7). In 1957, 11 transports moved 13 million gallons.

Total Volume of All Fuels

As shown in table 8, wholesale volume of both liquid fuels and LP gas by cooperatives totaled over 3.3 billion gallons in 1969. This compares with 2.3 billion gallons in 1957 and 1.6 billion gallons in 1950.

Lubricating Oil and Grease

Cooperatives sold 36.2 million gallons of lubricating oil at wholesale in 1969, in comparison with 36.9 million gallons in 1957 and 28.1 million gallons in 1950 (table 8).

Cooperatives also sold 13.8 million pounds of grease at wholesale in 1969, in comparison with 25.5 million pounds in 1957 and 19.3 million pounds in 1950.

Wholesale cooperatives supplied about 85 percent of the lube oil and grease sold at retail by cooperatives in 1969 and 1957, approximately 5 percent more than in 1950.

Indiana Farm Bureau Cooperative Association built the first cooperative refinery in the United States at Mt. Vernon, Ind., in 1939. Consumers Cooperative Association (now Farmland Industries, Inc.) constructed the second at Phillipsburg, Kans.

With the advent of World War II, the decline in the supply of petroleum fuels for farming became critical. As a result, several regional cooperatives purchased refineries to assure a dependable source of supply at reasonable prices. Acquiring these plants marked the first real excursion of cooperatives into integrated, technical manufacturing operations.

Number and Capacity of Refineries and Terminals Operated

Because of increases in octane requirements and the relatively low prices of residual fuel oil in some years, cooperatives have modernized their facilities to permit the production of more high octane gasoline and heating fuels as well as the manufacture of additional products such as asphalt and coke. In most instances, plant capacity has been increased to justify installation of modern cracking and reforming units.

The high cost of this modernization and the availability of more adequate supplies of fuel have caused a decrease in cooperative refineries since 1950. The fact that some plants were poorly located for the most efficient transportation of fuels to regional distribution areas also contributed to the decline.

In 1969, nine cooperatives owned eight refineries individually or jointly (table 9). One refinery association was owned by six regionals and another by two. Three natural gas products plants having a capacity of 68 million cubic feet of gas a day were also operated by one regional cooperative. Eleven refineries

Table 9.– Capacities (barrels per calendar day) of cooperative petroleum refineries on December 31, 1950, 1957, and 1969

Process and year	Refineries reporting	Charge (input)		Gasoline (output)	
		Total cooperatives	Percentage of U.S. total	Total cooperatives	Percentage of U.S. total
	Number	*Barrels*	*Percent*	*Barrels*	*Percent*
Crude oil distillation:					
1950	20	144,500	2.0	---	---
1957	11	155,700	1.6	---	---
1969	8	214,500	1.8	---	---
Catalytic cracking:					
1950	4	21,300	1.0	(1)	(1)
1957	8	64,550	1.5	(1)	(1)
1969	8	74,400	1.8	42,030	1.9
Catalytic reforming:[2]					
1957	8	29,530	1.9	(1)	(1)
1969	8	34,070	1.4	30,080	1.4
Thermal cracking:					
1950	17	47,800	1.7	(1)	(1)
1957	11	25,925	1.2	(1)	(1)
1969	4	19,200	3.0	7,225	4.0
Unifining:					
1957	3	8,500	(1)	(1)	(1)
1969	2	11,600	(1)	(1)	(1)
Polymerization:					
1957	8	6,845	(1)	(1)	(1)
1969	1	50	(1)	(1)	(1)
Alkylation:					
1957	(1)	1,500	(1)	(1)	(1)
1969	4	21,950	2.5	16,250	2.4
Coking:					
1957	2	2,350	(1)	(1)	(1)
1969	3	24,300	2.9	3,050	1.6
Total cracking, reforming, coking, and alkylation:					
1950	17	69,100	(1)	(1)	(1)
1957	11	139,200	(1)	(1)	(1)
1969	8	168,220	1.7	98,635	1.7

[1] Data not obtained. [2] None reported thermal reforming.

were operated by 13 regionals in 1957 and 20 refineries by 14 associations in 1950.

The eight cooperative petroleum refineries in operation in 1969 had a total crude oil distillation capacity of 214,500 barrels per calendar day, compared with 155,700 barrels in 1957 and 144,500 barrels in 1950. This was about 1.8 percent of the crude oil capacity of all refineries in the United States in 1969, in comparison with 1.6 percent in 1957 and 2.0 percent in 1950.

Four of these eight plants had a capacity of 5,000–20,000 barrels a day; two plants, from 20,100 to 40,000 barrels; and two, from 40,100 to 60,000 barrels (app. table 3).

Catalytic cracking capacity of cooperative petroleum refineries, although on the increase since 1950, was only 1.8 percent of the industry total in 1969 (table 9). Catalytic input or charge capacity amounted to 74,000 barrels a day by eight refineries in 1969, compared with 21,300 barrels a day by four refineries in 1950. Gasoline output capacity was 42,030 barrels a day in 1969, or 1.9 percent of the total.

Thermal cracking input capacity decreased from 47,800 barrels a day by 17 refineries in 1950 to 19,200 barrels a day by four refineries in 1969.

Two refineries reported unifining units having a total capacity of 11,600 barrels a day in 1969, compared with three refineries having a total capacity of 8,500 barrels a day in 1957.

Eight cooperative refineries operated catalytic reforming units in 1969 with an input capacity of 34,070 barrels a day and a gasoline output capacity of 30,080 barrels a day. These capacities each represented about 1.4 percent of the industry total. Most of the facilities were platforming units.

Only one cooperative refinery reported polymerization capacity of 50 barrels a day in 1969, compared with eight cooperatives having a total capacity of 6,845 barrels in 1957.

Four refineries had a combined alkylation input capacity of 21,950 barrels a day in 1969, or 2.5 percent of the industry total. Output capacity was 16,250 barrels, or 2.4 percent of the total.

Other facilities included coking units with a capacity of 24,300 barrels a day at three plants and asphalt units at two plants. One plant refined lubricating oil and manufactured wax. Another had a grease manufacturing capacity of 20.9 million pounds a year.

In 1969, total cracking, reforming, alkylation, and coking input or charge capacity of cooperatives was 168,220 barrels a day, or 1.7 percent of U.S. capacity. Total output or gasoline production capacity of cooperative facilities was 98,635 barrels a day, also equal to 1.7 percent of U.S. capacity.

In 1969, storage terminals at cooperative refineries had a total capacity of 7,590,455 barrels of refined fuels, compared with 5,260,000 barrels in 1950 (table 10). Crude oil storage facilities totaled 2,756,000 barrels, an increase from the 2,585,000 barrels reported in 1949.

Table 10.–Storage and transportation facilities operated at cooperative refineries, 1950, 1957, and 1969

Item	1950	1957	1969
	Barrels	*Barrels*	*Barrels*
Capacity of storage terminals for–			
Refined fuels	5,260,000	(1)	7,590,455
Crude oil	2,585,000	(1)	2,756,000
	Miles	*Miles*	*Miles*
Product pipelines owned	258	694	909
	Number	*Number*	*Number*
Barges and tankers operated mainly for products	24	13	3
Highway transports operated mainly for products	(1)	(1)	130
	Barrels	*Barrels*	*Barrels*
Products (liquid fuels) transported from refineries by these facilities:			
Pipelines	(1)	9,945,010	[2] 19,778,592
Barges and tankers	(1)	3,760,000	4,000,000
Highway transports	(1)	(1)	[3] 9,300,000
Total	---	---	33,078,592

[1] Data not obtained. [2] All but 705,000 barrels transported for the cooperatives. [3] Includes 1,300,000 barrels of LP gas.

Crude Oil Processed

Cooperative refineries processed 68.7 million barrels of crude oil, or 188,219 barrels per calendar day in 1969 (table 11). This compares with 138,369 barrels a day in 1957 and 106,900 barrels a day in 1950.

These volumes were equivalent to 1.9, 1.7, and 1.8 percent of the total barrels processed (runs to stills) in these respective years by all refineries in the United States. One refinery also processed a substantial quantity of stocks other than crude oil.

Production of Refined Fuels

Liquid Fuels

Production of liquid fuels by cooperative refineries in 1969 totaled 70.9 million barrels (3 billion gallons), or 194,246 barrels a calendar day (table 11). This exceeded the volume of crude oil processed because other stocks were utilized. Production was equal to the total volume distributed at retail and to 106 percent of the quantity sold at wholesale by all cooperatives. In terms of total net volume (retail sales plus wholesale and direct refining sales to noncooperatives), cooperatives refined about 77 percent of this amount.

In 1950, production of liquid fuels totaled 33.3 million barrels, or 91,300 barrels a day, representing about 100 percent of retail and 86 percent of wholesale volume.

A comparison of yields of seven of the eight refineries in 1957 and 1969 (using total quantity of liquid fuels refined as the base) showed an increase in the proportion of premium gasoline and diesel fuel refined and a decrease in regular gasoline and fuel oil (table 11). Data were not included on one refinery that processed a considerable amount of stocks other than crude oil and produced a large percentage of premium gasoline and fuel oil. Nor were data obtained from all plants on the complete production of residual fuel oil and other products refined in 1969.

The 909 miles of product pipelines owned by cooperatives in 1969 transported about 20 million barrels of liquid fuels from refineries to terminals, most of it for distribution by cooperatives. This was double the volume transported in 1957.

Cooperatives had no barges transporting refined fuels in 1969, compared with 10 in 1957. One association still operated three tankers, however.

Table 11.—Crude oil processed and products refined or manufactured by petroleum cooperatives, 1969

Type of product	1950	1957	1969
	Barrels	*Barrels*	*Barrels*
Crude oil run or processed	39,018,500	50,504,685	68,754,000
Products refined or manufactured	33,300,000	44,603,300	70,900,000
	Percent[1]	*Percent*[1]	*Percent*[1]
Premium gasoline	(2)	8.2	11.7
Regular gasoline	(2)	53.7	50.1
Diesel fuel	(2)	6.6	9.0
Kerosene	(2)	1.9	2.1
Fuel oil	(2)	26.8	23.2
Other liquid fuels	(2)	2.8	3.9
Total liquids	(2)	100.0	100.0
	Barrels	*Barrels*	*Barrels*
Liquefied petroleum gas	(2)	676,442	1,937,000
Lubricating oil refined	202,380	429,595	384,500
Lubricating oil blended	374,167	48,262	449,032
	Pounds	*Pounds*	*Pounds*
Grease	5,321,000	6,753,000	5,250,000
	Tons	*Tons*	*Tons*
Coke produced	(2)	120,900	203,581
Asphalt produced	(2)	35,822	142,850
Wax produced	(2)	(2)	5,630

[1] Yield data from 7 of the 8 refineries. [2] Not obtained.

Liquefied Gas

Six cooperative refineries produced 1,937,000 barrels (81.4 million gallons) of LP gas in 1969. This was 15 percent of the total wholesale volume of cooperatives that year. Five cooperatives reported producing 676,442 barrels in 1957.

Blending and Refining Lubricating Oil

In the 1930's, several regional cooperatives undertook the blending or compounding of motor oils to alleviate difficulties in supplying members with uniform lubricating oils which could withstand motor heat and in buying oils guaranteed to meet specifications.

In 1969, regional cooperatives operated five oil blending or compounding plants. Approximately 449,032 barrels, or 18.9 million gallons, of oil were processed—about 8 percent less than in 1957. Cooperatives thus blended about 61 percent of the lube oil they retailed in 1969 and 52 percent of that wholesaled. This compares with 95 percent of retail volume and 55 percent of wholesale volume in 1957.

A few of the smaller regional cooperatives bought bulk lubricating oil from other regional cooperatives and barreled or packaged it under their own brands in their own plants.

Only Farmland Industries, Inc., at its Coffeyville, Kans., refinery, has lubricating oil refining facilities. In 1969, these included units for vacuum distillation, furfural extraction, methyl-ethyl-ketone extraction, hot clay contacting, and wax slabbing. Approximately 16,149,000 gallons (384,500 barrels) of lube oil were produced in 1969—a decline from 1957 but substantially more than the 1950 volume. This output represented about 42.4 percent of the total gallons distributed at retail by all cooperatives and 44.5 percent of that sold at wholesale. Comparable figures in 1957 were 85 percent of retail volume and 49 percent of wholesale volume.

Manufacture of Grease and Other Products

Only one regional cooperative operated a grease plant in 1969. Production amounted to 5,250,000 pounds, less than the quantity produced in 1957 but about the same as that in 1950. Some of this grease was supplied to other wholesale cooperatives. Total production in 1969 was about 38 percent of the total wholesale volume of cooperatives.

Other finished products of cooperative refineries included the following: Coke, 203,581 tons in 1969 by three refineries, in comparison with 120,190 tons in 1957 by two plants; asphalt, 142,850 tons in 1969 by two refineries, in comparison with 35,822 tons in 1957 by two plants; and wax, 5,630 tons by one plant in 1969.

Production of Crude Oil

Cooperatives began to produce crude oil soon after they acquired refineries—another major achievement in vertical integration. Their objectives were to ensure a more dependable supply of crude oil, spread risks, and realize additional gains, especially in years of abnormally small savings from refining operations.

Producing Oil and Gas Wells

In 1969, 11 cooperatives, individually or cooperatively, operated 8,111 oil wells on a gross basis and owned 1,954 on a net basis (table 12). Although showing a substantial increase in gross ownership since 1950, cooperatives accounted for only 1.5 percent of the total producing wells in the United States in 1969.

On December 31, 1969, cooperatives also held under lease 151,000 acres of producing oil lands (leaseholds, royalties, and mineral rights) and 2,447,000 acres of undeveloped or prospective leaseholds, royalties, and mineral rights. These acreages were substantial increases over those held in 1950. Estimated net crude oil reserves of these cooperatives totaled 54.2 million barrels in 1969, compared with 32.2 million barrels in 1950.

Four cooperatives also owned 469 natural gas wells on a gross basis and 171 on a net basis in 1969. Three of these cooperatives estimated their natural gas reserves totaled 161.9 billion cubic feet at the end of their 1969 fiscal year.

Production Operations

Crude oil production by cooperatives includes the operation and maintenance of equipment to lift the crude oil and move it into storage tanks, as well as the cleaning out and conditioning of wells to achieve the highest possible recovery from the oil sand.

As shown in table 12, cooperatives in 1969 produced 60 million barrels of crude oil, or 164,318 barrels per calendar day, on a gross basis (before eliminating oil belonging to royalty owners and partners in jointly owned leases). This volume was

Table 12.Crude oil and natural gas production properties owned on December 31, and quantity of oil and gas produced, 1950, 1957, and 1969

Item	1950		1957		1969	
	Gross	Net	Gross	Net	Gross	Net
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Cooperatives engaged in –						
Oil production	12	---	12	---	11	---
Gas production	0	---	2	---	4	---
Oil wells owned	1,945	1,562	3,318	1,691	8,111	1,954
Gas wells owned	(1)	(1)	(1)	(1)	469	171
	1,000 barrels	*1,000 barrels*	*1,000 barrels*	*1,000 barrels*	*1,000 barrels*	*1,000 barrels*
Crude oil reserves owned	(1)	32,250	(1)	(1)	762,573	66,732
	Barrels per day	*Barrels per day*	*Barrels per day*	*Barrels per day*	*Barrels per day*	*Barrels per day*
Crude oil produced	29,400	15,292	42,653	17,339	164,318	25,471
	Million cubic feet	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*
Natural gas reserves owned[2]	(1)	(1)	(1)	(1)	161,900	---
Natural gas produced	(1)	(1)	(1)	(1)	95,448	17,019
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Proven or producing oil lands	63,488	---	(1)	---	151,000	---
Undeveloped or prospective oil lands	310,032	---	(1)	---	2,447,000	---

[1] Data not obtained. [2] Reported by 3 cooperatives.

equal to 1.8 percent of total U.S. crude oil production in 1969.

Net ownership of cooperatives in 1969 was 9.3 million barrels (25,471 barrels a day), about 15 percent of the gross (table 12 and fig. 1). Comparable figures for 1957 and 1950 were 17.3 million barrels and 15.3 million barrels, respectively.

All cooperatives with refineries had some crude interests, but two associations with crude production had no refineries in 1969.

Gross production of crude oil by cooperatives represented 87 percent of the crude oil processed by the associations in 1969, compared with 31 percent in 1957 and 20 percent in 1950. Net production of all cooperatives represented only 13.2 percent of the crude oil processed in 1969, compared with 12.5 percent in 1957 and 14.3 percent in 1950.

The mileage of cooperatively owned gathering pipelines and trunk pipelines has declined since 1950, although most crude oil still moves by this means. Cooperatives owned 1,201 miles of gathering pipelines and 272 miles of trunk pipelines for moving crude oil in 1969 (table 13). These cooperatively owned lines transported about 28 million barrels of crude oil in both 1969 and 1957, most of it for the associations' own use.

No barges were operated by the associations in 1969. In 1957, seven barges hauled 2.5 million barrels. Seven highway transports hauled over 875,000 barrels in 1969—a reduction from the 1.9 million barrels moved by 25 trucks in 1957.

Crude Oil Purchasing

Data were not obtained on the volume of crude oil purchased by cooperatives from royalty interest holders, independent producers, and other refiners. Some cooperatives, besides having access to the gross crude oil produced jointly with other firms, control additional amounts through their own pipeline-gathering operations and by having first call to purchase various amounts. In addition to gathering oil produced by the cooperatives, these pipelines receive crude oil purchased by the cooperatives from other carriers.

Natural Gas Production

As shown in table 12, four cooperatives reported operating 469 natural gas wells, with a net ownership of 171 wells in 1969. Gross production of gas totaled 95.4 billion cubic feet, and net production, 17 billion cubic feet.

Table 13.–Crude oil transportation facilities operated by cooperatives on December 31 and quantity of crude oil transported, 1950, 1957, and 1969

Type	1950	1957	1969
	Miles	*Miles*	*Miles*
Crude oil pipelines owned:			
Gathering	1,765	1,499	1,201
Trunk	610	566	272
	Number	*Number*	*Number*
Barges and tankers operated	[1]	7	0
Highway transports operated	8	25	7
	Barrels	*Barrels*	*Barrels*
Crude oil transported by these facilities:			
Pipelines	[1]	[2] 28,349,000	[3] 27,946,239
Barges and tankers	[1]	2,503,000	0
Highway transports	[1]	[1]	[4] 875,086

[1] Data not obtained.
[2] 26,931,550 barrels transported for own use.
[3] 22,953,156 barrels transported for own use.
[4] All transported for own use.

Transportation

The various transportation facilities utilized and the petroleum moved at each major level of operation have been discussed in the appropriate sections of this report. Tables 14 and 15, summarizing these data, indicate the quantity and percentage of liquid fuels, crude oil, and LP gas transported in cooperative equipment in each major type of operation in 1957 and 1969.

Table 14.–Integration of transportation facilities into cooperative petroleum operations, by type of fuel, 1957 and 1969

Item	1957	1969
	Percent	*Percent*
Liquid fuels:		
Retail volume delivered in co-op tank trucks	95	95
Wholesale volume hauled in co-op highway transports	56	51
Refinery output transported in co-op pipelines	22	28
Refinery output transported in co-op barges and tankers	8	6
Crude oil processed that was moved by–		
Co-op pipelines	54	41
Co-op barges and tankers	5	0
Co-op highway transports	4	1.3
Gross production of crude oil moved in–		
Co-op gathering and trunk pipelines	66	47
Co-op barges	6	0
Co-op highway transports	[1]	1.5
LP gas:		
Retail volume delivered in co-op tank trucks	98	98
Wholesale volume hauled in co-op highway transports	14	59

[1] Data not obtained.

Table 15.–Petroleum transportation equipment and storage facilities of cooperatives, 1950, 1957, and 1969

Item	Unit	1950	1957	1969
Retail tank trucks operated for–				
Liquid fuels	No.	5,370	5,361	6,877
LP gas	No.	70	323	1,710
Highway transports operated from terminals and refineries to local bulk plants for–				
Liquid fuels:				
By local co-ops	No.	153	179	324
By wholesale co-ops	No.	214	263	331
By refinery co-ops or divisions	No.	(1)	(1)	130
Liquid fuels transported by–				
Wholesale cooperatives	1,000 gal.	(1)	1,235,715	1,423,018
Refinery co-ops or divisions	1,000 gal.	(1)	(1)	[2] 336,000
LP gas	No.	(1)	11	156
LP gas transported by wholesale co-ops	1,000 gal.	(1)	13,171	309,675
Barges and tankers operated from refineries to terminals for liquid fuels[3]	No.	24	13	3
Liquid fuels transported	Bbl.	(1)	3,760,000	4,000,000
Product pipelines operated from refineries to terminals	Miles	258	694	909
Liquid fuels transported	Bbl.	(1)	9,945,010	19,778,000
Crued oil gathering pipelines owned	Miles	1,765	1,499	1,201
Crude oil trunk pipelines owned	Miles	610	566	272
Crude oil transported[4]	Bbl.	(1)	28,349,005	27,946,000
Barges operated for crude oil[1]	No.	(1)	7	- 0 -
Crude oil transported	Bbl.	(1)	2,503,000	- 0 -
Highway transports operated for crude oil	No.	8	25	7
Crude oil transported	Bbl.	(1)	1,864,155	875,000
Refined fuels storage terminals operated (exclusive of refinery terminals)	No.	12	20	28
Capacity at end of year	Bbl.	1,326,190	3,692,857	6,010,000
Refinery terminals–storage capacity:				
For products	Bbl.	5,260,000	(1)	7,590,455
For crude oil	Bbl.	2,585,000	(1)	2,756,000

[1] Data not obtained. [2] Also transported 54,600,000 gallons of LP gas. [3] 7 barges reported transporting crude oil in 1957 were assumed to be used also for transporting refined products. Data not available for 1950. [4] Total transported, excluding duplication between trunk and gathering lines.

Net Margins

The 27 regional cooperatives in this study reported net margins of $36.6 million from their petroleum operations in 1969 (table 16). About half came from marketing (retail and wholesale distribution) and the remainder from refining, production, and transportation operations. In some cases, net margins on various operations were estimated, because some cooperatives reported refining and production together or because they included transportation with their wholesaling, refining, or producing activities.

To avoid duplication, cooperatives were requested to report net margins on their own operations, exclusive of dividends on stock and patronage refunds received from other cooperatives.

Table 16.–Net margins on petroleum operations before income taxes, and cooperatives reporting each operation, 1969

Operation	Cooperatives	Net margins[1]
	Number	*Dollars*
Retailing	9	4,763,900
Wholesaling	19	14,642,160
Refining[2]	6	16,267,540
Production[2]	4	(780,000)
Transportation[3]	5	1,717,100
Total	26	36,610,700

[1] After allocation of general administrative and overhead expenses to the petroleum divisions. [2] Refining and production combined in some cases. [3] 21 cooperatives included transportation with their wholesaling, refining, or production operations.

Appendix Tables

Appendix table 1.–Regional cooperatives handling petroleum products, by location and type of operation, December 31, 1969

Cooperative and location	Type of operation			
	Retailing	Wholesaling	Refining	Producing
Eastern Area				
Agway Inc. Syracuse, N.Y.		X		
Agway Petroleum Corporation Syracuse, N.Y.	X			
Texas City Refining, Inc.[1] Texas City, Tex.			X	X
Maine Potato Growers, Inc. Presque Isle, Maine	X			
Southern States Cooperative Richmond, Va.	X	X	([1])	([1])
FCX, Inc. Raleigh, N.C.	X	X		
The Farm Bureau Cooperative Association (became Landmark, Inc., in 1971) Columbus, Ohio		X		
United Cooperatives, Inc. Alliance, Ohio		X		
Farmers Petroleum Cooperative Lansing, Mich.	X	X		X
Indiana Farm Bureau Cooperative Association Indianapolis, Ind.		X	X	
Tennessee Farmers Cooperative La Vergne, Tenn.		X		
Alabama Farmers Cooperative Decatur, Ala.		X		
MFC Services (AAL) Jackson, Miss.		X		
Delta Purchasing Federation (AAL) Greenwood, Miss.		X		
Central Area				
FS Services, Inc. Bloomington, Ill.		X		
Fox Cooperative, Inc. Appleton, Wis.		X		
Midland Cooperatives, Inc. Minneapolis, Minn.		X	X	X
Farmers Union Central Exchange St. Paul, Minn.		X	X	X

See end of table for footnote references.

Continued–

Appendix table 1.–Regional cooperatives handling petroleum products, by location and type of operation, December 31, 1969–Continued

Cooperative and location	Type of operation			
	Retailing	Wholesaling	Refining	Producing
Central Area–Continued				
Land O'Lakes, Inc. Agricultural Services Division Ft. Dodge, Iowa		X		
Cooperative Service Company Waterloo, Iowa		X		
Farmland Industries, Inc. Kansas City, Mo.		X		
CRA, Inc. Kansas City, Mo.			X	X
Terra Resources, Inc. Tulsa, Okla.				X
MFA Oil Company Columbia, Mo.	X	X		
National Cooperative Refinery Association[2] McPherson, Kans.			X	X
Southern Farmers Association N. Little Rock, Ark.		X		
Western Area				
Utah Cooperative Association Salt Lake City, Utah		X		
Grange Cooperative Wholesale[3] Spokane, Wash.		X		
Western Farmers Association Seattle, Wash.	X			
Pacific Supply Cooperative Portland, Ore.		X		X
Southwest Cooperative Wholesale Phoenix, Ariz.		X		
Total, 27 cooperatives	7	24	6	8

[1] Two-thirds owned by Agway, Inc., and one-third owned by Southern States Cooperative. [2] Owned by Farmland Industries, Inc., Farmers Union Central Exchange, Midland Cooperatives, Inc., Land O'Lakes, Inc., FS Services, Inc., and MFA Oil Company. [3] Merged with Farmers Union Central Exchange, St. Paul, Minn., in 1971.

Appendix table 2.–U.S. petroleum industry: Marketing, refining, production, and transportation of products, 1950, 1957, and 1969[1]

Item	1950	1957	1969
Marketing	*Barrels per calendar day*[2]	*Barrels per calendar day*[2]	*Barrels per calendar day*[2]
Domestic demand for–			
Gasoline	2,724,000	3,817,000	5,596,000
Kerosene	323,000	295,000	275,000
Distillates	1,082,000	1,691,000	2,466,000
Total	4,129,000	5,803,000	8,337,000
Liquefied petroleum gas	227,000	453,000	1,023,000
	Number	*Number*	*Number*
Refining			
Refineries operated	325	289	262
Refineries shut down	32	29	19
	Barrels per calendar day	*Barrels per calendar day*	*Barrels per calendar day*
Capacities (December 31):[3]			
Crude distillation	6,963,644	9,407,707	12,074,323
Thermal cracking:			
Input[4]	2,812,000	2,202,355	641,490
Output	776,746	529,273	179,557
Thermal reforming:			
Input	([5])	([5])	32,400
Output	([5])	([5])	24,690
Catalytic cracking:			
Input[4]	2,130,000	4,180,065	4,212,478
Output	780,810	1,456,687	2,164,418
Catalytic reforming:			
Input[4]	366,500	1,520,930	2,512,920
Output	295,500	1,223,160	2,123,152
Alkylation			
Input	([5])	([5])	888,399
Output	([5])	([5])	684,400
Coking			
Input	([5])	([5])	833,798
Output	([5])	([5])	185,600
Crude oil run to stills (processed)	5,739,000	7,919,000	10,629,000
	Number	*Number*	*Number*
Production			
Producing oil wells	465,870	569,273	542,227
	Barrels per calendar day	*Barrels per calendar day*	*Barrels per calendar day*
Crude oil produced	5,407,000	7,169,000	9,238,000
	Miles	*Miles*	*Miles*
Transportation			
Crude oil gathering pipelines	47,593	[6] 73,526	[7] 74,124
Crude oil trunk pipelines	64,622	[6] 78,594	[7] 70,825
Product pipelines	16,374	[6] 36,420	[7] 64,529
	Barrels per calendar day	*Barrels per calendar day*	*Barrels per calendar day*
Crude oil transported in pipelines[8]	4,223,000	5,850,000	8,099,000
Products transported in pipelines	1,094,000	2,471,000	6,717,000

[1] Source: Oil and Gas Division, U.S. Dept. Interior, except as otherwise indicated. [2] All data on calendar day basis except those for input or charge capacity indicated by footnote 4. [3] Includes operating and shutdown plants. [4] Barrels per stream day calculated at 0.95 of calendar day basis, or 347 days per year, as reported in Oil and Gas Journal, March 4, 1958. [5] Data not obtained. [6] As of last survey, January 1, 1956. [7] 1968 last available data. [8] Quantities received at refineries via pipelines. Additional quantities moved by pipelines from producing fields to Gulf coast ports.

Appendix table 3.–Capacities (barrels per day) of cooperative petroleum refineries, type of process, end of 1969 business year

Refinery and type of facilities	Charge (input)	Gasoline (output)
	Barrels	*Barrels*
Indiana Farm Bureau Co-op Association:		
Mt. Vernon, Ind.		
Crude oil distillation	12,500	---
Catalytic cracking	3,000	2,500
Catalytic reforming	3,000	2,700
Thermal cracking	3,000	1,000
Alkylation	1,000	1,000
Farmland Industries, Inc.:[1]		
CRA, Inc. (subsidiary)		
Coffeyville, Kans.[2]		
Crude oil distillation	31,000	---
Catalytic cracking (fluid)	12,250	5,900
Catalytic reforming	5,500	4,900
Alkylation unit (hydrofluoric acid)	4,600	1,800
Delayed coking unit	8,500	1,000
Platformer	([3])	([3])
Unifiner	([3])	([3])
Gas concentration unit	([3])	([3])
Light petroleum gas unit (for propane)	---	---
Phillipsburg, Kans.		
Crude vacuum distillation	18,000	---
Catalytic cracking (fluid)	6,000	3,600
Catalytic reforming	3,500	3,200
Alkylation (hydrofluoric acid)	2,300	1,400
Platformer	([3])	([3])
Unifiner	([3])	([3])
Gas recovery unit	([3])	([3])
Scottsbluff, Nebr.		
Crude oil distillation	5,000	---
Catalytic cracking (fluid)	2,000	1,300
Catalytic reforming	1,000	900
Polymerization unit	([3])	([3])
Platformer	([3])	([3])
Gasoline mixing and treating equipment	---	---
National Cooperative Refinery Association		
McPherson, Kans.		
Crude distillation	46,000	---
Catalytic cracking	16,000	8,600
Catalytic reforming	7,000	5,800
Alkylation	5,000	5,000
Coking	14,000	1,700
Farmers Union Central Exchange		
Laurel, Mont.		
Crude distillation	26,000	---
Catalytic cracking	11,000	10,300
Catalytic reforming	4,450	4,200
Thermal cracking	5,700	(Shutdown)
Alkylation	2,400	2,400
Midland Cooperative, Inc.		
Cushing, Okla.		
Crude oil distillation	16,000	---
Catalytic cracking	5,800	4,350
Catalytic reforming	2,580	2,580
Thermal cracking	6,000	6,000
Alkylation	1,350	1,350
Coking	1,800	350

See end of table for footnote references.

Continued–

Appendix table 3.–Capacities (barrels per day) of cooperative petroleum refineries, type of process, end of 1969 business year–Con't.

Refinery and type of facilities	Charge (input)	Gasoline (output)
	Barrels	*Barrels*
Texas City Refining, Inc.		
Texas City, Tex.		
Crude oil distillation	60,000	---
Catalytic cracking	18,350	9,080
Catalytic reforming	7,040	5,800
Thermal cracking	4,500	225
Alkylation	5,300	3,300
Total, 8 cooperative refineries		
Crude oil distillation	214,500	---
Catalytic cracking	74,400	42,030
Catalytic reforming	34,070	30,080
Thermal cracking	[4] 19,200	7,225
Alkylation	21,950	16,250
Coking	24,300	3,050
Total cracking, reforming, coking and alkylation	168,220	98,635

[1] Also operates the following natural gas facilities:

Natural gas products processing plants	*Million cubic feet per day*
Lamont, Okla.	13
Quitman, Tex.	25
Mertzon, Tex.	30

These plants include refrigeration and fractionation equipment coupled with gathering lines and equipment.

[2] This refinery also has the following crude oil processing facilities: Vacuum distillation unit, furfural extraction unit, methyl-ethyl-ketane extraction unit, hot clay contacting unit, wax slabbing facilities, and lube oil compounding.

[3] Data not obtained.

[4] Includes 5,700 barrels in a shutdown unit.

Source: Petroleum Refineries in the United States and Puerto Rico, January 1, 1970. Mineral Industry Surveys, Bur. Mines, U.S. Dept. Interior.

OTHER FCS PUBLICATIONS AVAILABLE

Supply Cooperatives. Bulletin Reprint 2, J. Warren Mather and staff.

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